

**WHAT IS CLAIMED IS:**

2            1.      A method of maintaining frame quality of data being transported in  
3      a telecommunications system from a first user equipment (UE) through a core  
4      network (CN) to a second UE, the method comprising the steps of:

5            (a) performing, at a first radio network controller (RNC), a cyclic  
6      redundancy check (CRC) on at least one radio bearer frame being received from  
7      the first UE;

8            (b) setting, at the first RNC, a frame quality classifier (FQC) field  
9      according to the results of the CRC;

10           (c) forwarding a corresponding frame with the set FQC field to a first  
11      media gateway (MGW) in the CN via an Iu UP interface;

12           (d) forwarding the corresponding frame with the set FQC field to at least  
13      one other MGW in the CN via a Nb UP interface; and

14           (e) forwarding the corresponding frame with the set FQC field to a  
15      second RNC associated with the second UE via a second Iu UP interface.

1            2.      The method of claim 1, wherein in step (d), at least one of the at  
2      least one other MGW performs a new CRC on the received corresponding  
3      frames and updates the FQC field or passes the FQC field unchanged according  
4      the results of the new CRC, a 'Delivery of erroneous SDUs' attribute received  
5      from an associated call control server in the CN, and the FQC field in the  
6      received corresponding frames.

1            3.      The method of claim 2, wherein in step (d), the at least one of the  
2      at least one other MGW performs the new CRC on the received corresponding

frames and updates the FQC field to a 'bad' indication when the results of the new CRC indicate 'not OK' and the 'Delivery of erroneous SDUs' attribute indicates "Yes".

4. The method of claim 2, wherein in step (d), the at least one of the at least one other MGW performs the new CRC on the received corresponding frames and updates the FQC field or passes the FQC field unchanged according to the results of the new CRC, the 'Delivery of erroneous SDUs' attribute, and the FQC field in the received corresponding frames, according to indications in the table below:

Input			Action
'Delivery of erroneous SDUs'	FQC in received PDU	Payload CRC	
'yes' or 'no'	'good'	OK	Leave FQC unchanged. Forward SDU and FQC to upper layer
'yes'	'bad radio'	OK	Leave FQC unchanged. Forward SDU and FQC to upper layer
'yes'	'good' or 'bad radio'	Not OK	Set FQC to 'bad'. Forward SDU and FQC to upper layer
'yes'	'bad'	Any	Leave FQC unchanged. Forward SDU and FQC to upper layer
'no'	'good'	Not OK	Drop SDU
'no'	'bad' or 'bad radio'	Any	Not applicable. SDUs are dropped at a previous link.
'no-error-detection-consideration'	Any	Any	Leave FQC unchanged. Forward SDU and FQC to upper layer

5. The method of claim 1, further comprising the steps of:

2            (f) performing, at the second RNC, a new CRC on the corresponding  
3 frames as received from the at least one other MGW;

4            (g) setting, at the second RNC, a FQC field in corresponding radio  
5 interface protocol frames with an updated value according to the results of the  
6 new CRC and the FQC field value in the frames received from the at least one  
7 other MGW; and

8            (h) forwarding the corresponding radio interface protocol frames with the  
9 updated FQC field from the second RNC to the second UE.

1            6.      The method of claim 5, wherein in step (g), the second RNC  
2 updates the FQC field or passes the FQC field unchanged according to the  
3 results of the new CRC, another 'Delivery of erroneous SDUs' attribute received  
4 from the same or another call control server, and the FQC field in the received  
5 corresponding frames.

1            7.      The method of claim 6, wherein in step (g), the second RNC  
2 updates the FQC field to a 'bad' indication when the results of the new CRC  
3 indicates 'not OK' and the other 'Delivery of erroneous SDUs' attribute indicates  
4 "Yes".

8. The method of claim 6, wherein in step (g), the second RNC updates the FQC field or passes the FQC field unchanged according to the results of the new CRC, the other 'Delivery of erroneous SDUs' attribute, and the FQC field in the received corresponding frames, according to indications in the table below:

Input			Action (on lu UP frame)
'Delivery of erroneous SDUs' (for each subflow)	FQC	CRC check (If payload CRC present) (on lu UP frame)	
'yes' or 'no'	'good'	OK	Pass the frame to radio interface protocols. Forward FQC unchanged.
'yes'	'bad radio'	OK	Leave FQC unchanged. Forward SDU and FQC to upper layer.
'yes'	'good' or 'bad radio'	Not OK	Set FQC to 'bad'. Pass the frame to radio interface protocols.
'yes'	'bad'	Any	Pass the frame to radio interface protocols. Forward FQC unchanged.
'no'	'good'	Not OK	Drop frame
'no'	'bad' or 'bad radio'	Any	Not applicable. SDUs are dropped at a previous link.

9. The method of claim 5, wherein in step (h), the radio interface protocol frames are forwarded to the second UE using radio resource control (RRC) protocols.

10. A method of providing frame quality information to a UE for data received by a RNC from a CN and transmitted to the UE via a radio interface, the method comprising the steps of:

4            (a) performing, at the RNC, a CRC on the data as received from a MGW  
5 of the CN;

6            (b) setting, at the RNC, a FQC field in corresponding radio interface  
7 protocol frames according to the results of the CRC and a FQC field value in the  
8 frames received from the MGW; and

9            (c) forwarding the corresponding radio interface protocol frames with the  
10 set FQC field from the RNC to the UE via the radio interface.

11           11.    The method of claim 10, wherein in step (b), the RNC sets the FQC  
12 field according to the results of the CRC, a 'Delivery of erroneous SDUs' attribute  
13 received from an associated call control server of the CN, and the FQC field in  
14 the received data.

15           12.    The method of claim 11, wherein in step (b), the RNC sets the FQC  
16 field to a 'bad' indication when the results of the new CRC indicates 'not OK' and  
17 the 'Delivery of erroneous SDUs' attribute indicates "Yes".

13. The method of claim 11, wherein in step (b), the RNC sets the FQC field according to the results of the CRC, the 'Delivery of erroneous SDUs' attribute, and the FQC field in the received data, according to indications in the table below:

Input			Action (on lu UP frame)
'Delivery of erroneous SDUs' (for each subflow)	FQC	CRC check (If payload CRC present) (on lu UP frame)	
'yes' or 'no'	'good'	OK	Pass the frame to radio interface protocols. Forward FQC unchanged.
'yes'	'bad radio'	OK	Leave FQC unchanged. Forward SDU and FQC to upper layer.
'yes'	'good' or 'bad radio'	Not OK	Set FQC to 'bad'. Pass the frame to radio interface protocols.
'yes'	'bad'	Any	Pass the frame to radio interface protocols. Forward FQC unchanged.
'no'	'good'	Not OK	Drop frame
'no'	'bad' or 'bad radio'	Any	Not applicable. SDUs are dropped at a previous link.

14. The method of claim 10, wherein in step (c), the radio interface protocol frames are forwarded to the UE using RRC protocols.

15. A method of maintaining frame quality of data being transported in a telecommunications system from a first UE through a CN to a second UE, the method comprising the steps of:

(a) performing, at a first RNC, a CRC on a radio bearer frame being received from the first UE;

6            (b) setting, at the first RNC, a plurality of FQC fields according to the  
7 results of the CRC;

8            (c) forwarding a plurality of subflows each with a corresponding one of the  
9 set FQC fields to a first MGW in the CN via an Iu UP interface, the plurality of  
10 subflows corresponding to the radio bearer;

11           (d) forwarding the corresponding subflows to at least one other MGW in  
12 the CN via a Nb UP interface; and

13           (e) forwarding the corresponding subflows to a second RNC associated  
14 with the second UE via a second Iu UP interface.

1           16.    The method of claim 15, wherein in step (d), at least one of the at  
2 least one other MGW performs a new CRC on the received corresponding  
3 subflows and updates the FQC field, passes the FQC field unchanged, or drops  
4 the frame according the results of the new CRC, a 'Delivery of erroneous SDUs'  
5 attribute received from an associated call control server of the CN, and the FQC  
6 field in the received corresponding subflows.

1           17.    The method of claim 16, wherein in step (d), the at least one of the  
2 at least one MGW performs the new CRC on the received corresponding  
3 subflows and updates the FQC field to a 'bad' indication when the results of the  
4 new CRC indicate 'not OK' and the 'Delivery of erroneous SDUs' attribute is  
5 "Yes".

1            18.    A system for maintaining frame quality of data being transported in  
2            a telecommunications system from a first UE through a CN to a second UE, the  
3            system comprising:

4            a first RNC that performs a CRC on one or more radio bearers frame  
5            being received from the first UE, sets a FQC field according to the results of at  
6            least one of the CRCs, and forwards corresponding data frames with the set  
7            FQC field to a first MGW in the CN via an Iu UP interface; and

8            a second MGW in the CN that receives the corresponding data from the  
9            first MGW via an Nb UP interface, performs a new CRC on the received  
10           corresponding data and updates the FQC field, passes the FQC field  
11           unchanged, or drops the frame according the results of the new CRC, a 'Delivery  
12           of erroneous SDUs' attribute received from an associated call control server in  
13           the CN, and the FQC field in the received corresponding data.

1            19.    A RNC for providing frame quality information to a UE for a frame of  
2            data received by the RNC from a CN and forwarded to the UE via a radio  
3            interface, wherein the RNC performs a CRC on the frame as received from the  
4            CN, sets a FQC field in a corresponding radio interface protocol frame with an  
5            updated value according to the results of the CRC and a FQC field value in the  
6            frame received from the MGW, and forwards the corresponding radio interface  
7            protocol frame with the updated FQC field from the RNC to the UE via the radio  
8            interface.

1            20.    The RNC of claim 19, wherein the RNC updates the FQC field,  
2            passes the FQC field unchanged, or drops the frame according to the results of  
3            the CRC, a 'Delivery of erroneous SDUs' attribute received from a call control  
4            server, and the FQC field in the received frames.



1            21.    The RNC of claim 20, wherein the RNC updates the FQC field to a  
2 'bad' indication when the results of the new CRC indicate 'not OK' and the  
3 'Delivery of erroneous SDUs' attribute indicates "Yes".

10037346-010202